DRC-2010-001748

State of Utah
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Department of
Environmental Quality

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DIVISION OF RADIATION CONTROL
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MEMORANDUM

TO: File

THROUGH: Loren Morton, PG, Manager LBM 2/9/10

FROM: Tom Rushing, PG JR 2/9/10

DATE: February 8, 2010

SUBJECT: Groundwater Protection Level Adjustment, Energy Solutions October 7, 2009, Request, Groundwater Monitoring Well No. I-1-30, and; September 28, 2009 EnergySolutions Notification of Late POOC Status Report for Groundwater Monitoring Well I-1-30:DRC Review Findings

Summary of Documents Received and Reviewed by DRC:

September 28, 2009 EnergySolutions letter regarding "Corrective Actions for the Late POOC Status Notification for Monitoring Well I-1-30 Gross Alpha."

October 7, 2009 EnergySolutions letter regarding "Groundwater Quality Discharge Permit UGW450005 Source and Contamination Assessment Study Plan for Gross Alpha at Monitoring Well I-1-30 Request for Permit Modification.

Summary of DRC Findings:

Late POOC Status Review of EnergySolutions Actions:

Per the September 28, 2009 EnergySolutions letter, DRC was informed that EnergySolutions did not act in compliance with Part I.G.2(a) of the facility Groundwater Quality Discharge Permit, Permit No.UGW450005 (GWQDP). Specifically, Part I.G.2(a) states that the permittee must, "Notify the Executive Secretary of probable out of compliance (POOC) status within 30 days of the initial detection."

Contrary to this requirement EnergySolutions did not report a gross alpha exceedence at monitoring well I-1-30 within 30 days. The report should have been made on or before July 24, 2009 but was not made until August 31, 2009 (38 days late).

In the September 28, 2009 letter, EnergySolutions provided self corrective action regarding this violation by:

1. Generating a condition report no. CR09-102,
2. Performing a causal analysis which determined that personnel error was the cause, due to an unawareness of the permit condition,
3. Implementing a periodic refresher training regarding the GWQDP for staff who will be performing data review actions.

EnergySolutions notes that the additional training will be captured in the tracking instruction (CL-CLWI-002) and will also include training regarding the RCRA Part B Permit.

EnergySolutions also notes that accelerated monitoring was triggered at the well and thus that the violation is isolated to a failure to report the exceeded parameter in a timely manner.

DRC has determined that enforcement discretion will be used regarding this violation, and will not pursue formal enforcement, based on the EnergySolutions explanations and in particular per DRC findings that:

1. The violation did not effect the requirement for elevated sampling at the well per POOC requirements, and,
2. EnergySolutions self identified the violation, reported it to DRC, and implemented reasonable corrective actions.

Monitoring Well I-1-30 Source Assessment:

EnergySolutions review of the gross alpha source assessment concludes that the increased gross alpha concentrations are from naturally occurring alpha emitters in the Clive groundwater. EnergySolutions uses the following evaluation criteria to support that assessment:

1. "The Mixed Waste facility is located approximately 360 feet downgradient of monitoring well I-1-30 as confirmed by monthly depth to water measurements and the generation of monthly contour maps. Additionally, the Mixed Waste embankment liner system has not accumulated appreciable liquids on the bottom or tertiary liner, indicating that no leakage into groundwater has occurred*,
2. The Mixed Waste evaporation pond is located approximately 200 feet down-gradient of I-1-30, as confirmed by monthly depth to water measurements and contour maps. The Mixed Waste pond is lined with two layers of HDPE and has a leak detection system subject to daily BAT monitoring. This monitoring has demonstrated no indication of liner system failure **,
3. The Class A, Class A North and Vitro disposal cells are down-gradient from I-1-30 as confirmed by monthly depth to water measurements and the generation of monthly contour maps.
4. Monitoring well I-1-30 is located cross gradient to the LARW and 11e.(2) disposal cells as confirmed by monthly depth to water measurements and the generation of monthly contour maps. Additionally, down-gradient monitoring wells GW-77, GW-64, GW-56R, and GW-16R do not exceed gross alpha GWPL's, and,
5. Alpha emitters are naturally occurring in Clive groundwater. A majority of the Clive monitoring wells have GWPLs above the universal GWPL of 15pCi/L." [(2)]

*The facility Groundwater Permit imposes a BAT requirement for maximum leakage flows into the "leakage detection system" sump and maximum allowable head (1ft) on the bottom liner. Per DRC review there have been no compliance issues at the Mixed Waste system.
** Per DRC inhouse communication, no failures of BAT at the Mixed Waste Pond were identified.

EnergySolutions additionally submitted a potentiomatric surface map (included as attachment 1 of this memo) showing the location and gradient contours for the Clive facility and monitoring wells where GWPL exceptions for gross alpha have been approved by DRC.

DRC agrees with the source assessment findings submitted by EnergySolutions, especially in regards to the fact that well I-1-30 is located hydraulically upgradient from the Mixed Waste, Class A, Class A North and Vitro disposal cells. Per DRC review of the gross alpha data plot (attachment 3) no obvious trend was noted, and; per the groundwater contour maps (.5 ft contours) there was not evidence of ground water mounding.

DRC therefore agrees that the gross alpha GWPL at I-1-30 can be adjusted according to satisfactory statistical evaluation.

Statistical Methods:

Per DRC review, EnergySolutions used several different statistical methods to evaluate the data. The methods used included:

1. Skewness and Kurtosis -- Relationships were compared with the Standard Error of Skewness (SES) and the Standard Error of Kurtosis (SEK),
2. Filliben's Statistic – Probability Plot Correlation Coefficient,
3. Shapiro-Wilk Test – Calculates statistic (W) to demonstrate normal data distribution, and,
4. Anderson-Darling Test Statistic.

Per past recommendations to EnergySolutions, DRC has recommended the use of the Shapiro-Wilk test for small data sets (N<50). DRC review of the statistical calculations comprised review of the data populations used, including verification that outliers and duplicate results had been culled from the data set. DRC reviewed the data and summary for each well and it appeared that the data sets had been appropriately reviewed and culled. Older data which was not generated by use of the EPA co-precipitation method (and was likely not adjusted) was deemed unreliable and was culled from the set. The data set was therefore only comprised of more recent data (nothing older than 2001).

DRC focus was primarily on the use of the Shapiro-Wilk test. Specifically DRC confirmed that the following values were correctly calculated,

1. Mean and Standard Deviation values,
2. Calculation of W Statistic,
3. Selection of critical values (Percentage Points) from *EPA Guidance* Table A-2 (95^{th} Percentile was used per DRC review),
4. Confirmation that W was above the critical value indicating normal distribution.

Comparison of W values computed by Enchemica and DRC are on the table below. Variation could be due to differences between DRC and Enchemica number rounding during calculations (A copy of the DRC calculations are attached to this memo as attachment 2).

Well Number	Parameter	EnergySolutions Computed W	DRC Computed W	Shapiro Wilk Critical Value ($\alpha = 0.05$)
I-1-30	Gross Alpha	.9456	0.9950	0.9050

Per DRC review both of these W values are high, indicating a likelihood of normal distribution, and are above the *EPA Guidance* Table A-2 "point values" which indicates that the data are within a normal range

and indicates normal distribution (95% of data within bounds). DRC and EnergySolutions values for the data mean and standard deviation were essentially the same. The DRC calculated limit mean + 2 sigma was 18.4 pCi/L and the EnergySolutions calculated limit was 18.6 pCi/L (attachment 2).

Agreed Upon Exceptions:

Based on the above DRC findings, the GWPL exception of 18.6 pCi/L for monitoring well I-1-30 is agreed upon by the Executive Secretary and will be included in the next permit modification (note: Since this is an increase in the GWPL concentration it is subject to public notice requirements.)

The current permit GWPL of 15 pCi/L will remain in effect until the agreed upon limit of 18.6 pCi/L has gone through public notice and is made effective by the Executive Secretary in an executed (signed) final permit.

DRC Actions:

DRC will send a "Findings and Upcoming Permit Modification" letter to EnergySolutions summarizing the agreed upon GWPL exception. DRC will clarify in the letter that the current GWPL will remain in effect until issuance of the new GWPL in a final permit modification.

DRC will also clarify that enforcement discretion will be used regarding the late POOC notification as detailed above.

References:

(1) EnergySolutions Letter (signed by Sean McCandless), dated September 28, 2009 "Re: Corrective Actions for the Late POOC Status Notification for Monitoring Well I-1-30 Gross Alpha"

(2) EnergySolutions Letter (signed by Sean McCandless, dated October 7, 2009, "Re: Groundwater Quality Discharge Permit UGW450005 Source and Contamination Assessment Study Plan for Gross Alpha at Monitoring Well I-1-30, Request for Permit Modification", and attachment dated October 6, 2009, Technical Memorandum, "Statistical Evaluation of Gross Alpha Results from Monitoring Well I-1-30" to Jeff Low from Robert Sobocinski

Attachment 1 – Potentiometric Surface Map and Gross Alpha Exceptions at Other Wells (Source See Memo Reference (2))

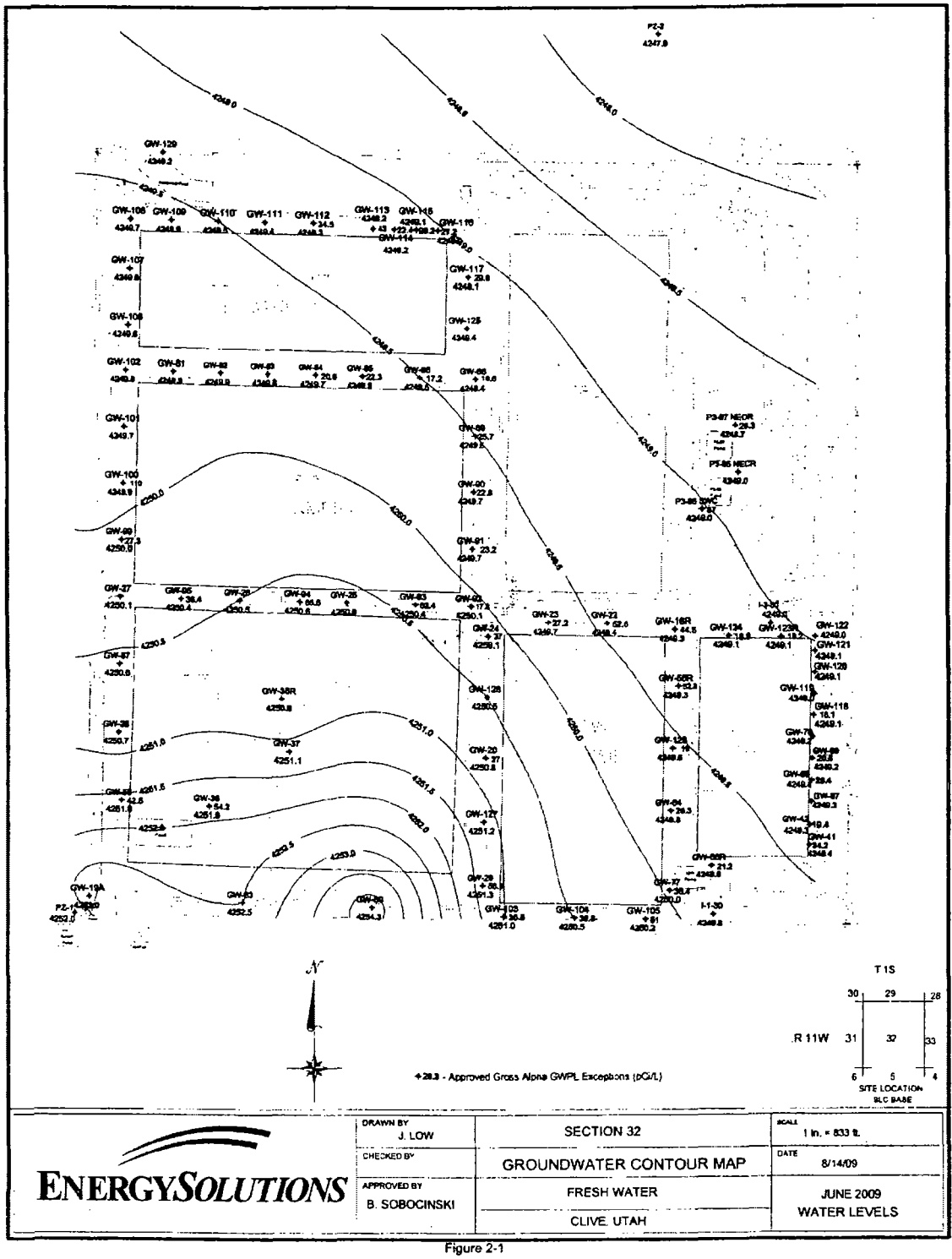

Figure 2-1

Attachment 2
Shapiro Wilk (n<50) Method DRC Cross Check Data Entered 2/8/10 TR

EnergySolutions Well I-1-30 Gross Alpha Data Per the October 7, 2009 Submission to DRC

i	x(i)	x(n-1+1)	x(n-i+1)^x(i)	a(n-i+1)	bi
1	6.3	18	11.7	0.4734	5.53878
2	7.1	17.1	10	0.3211	3.211
3	7.4	16.6	9.2	0.2565	2.3598
4	8.3	15.9	7.6	0.2085	1.5846
5	9	15.3	6.3	0.1686	1.06218
6	9.1	13	3.9	0.1334	0.52026
7	9.2	12.8	3.6	0.1013	0.36468
8	9.4	12.1	2.7	0.0711	0.19197
9	10.2	11.7	1.5	0.0422	0.0633
10	11.2	11.2	0	0.014	0
11	11.2	11.2	0		
12	11.7	10.2	-1.5		
13	12.1	9.4	-2.7		
14	12.8	9.2	-3.6		
15	13	9.1	-3.9		
16	15.3	9	-6.3		
17	15.9	8.3	-7.6		
18	16.6	7.4	-9.2		
19	17.1	7.1	-10		
20	18	6.3	-11.7		total =
					14.89657

Standard Deviation Calculation:

Mean = 11.5 Var. = 234.7495

Standard Deviation = 3.4

W Statistic = 0.995048575

DRC Calculated Limit (Mean + 2sigma)= 18.4 pCi/L

EnergySolutions Calculated Limit = 18.6 Pci/L

Attachment 3 -- Scatter Plot of I-1-30 Gross Alpha Data

x Date of Sample	y Gross Alpha PCI/L
3/29/2001	13
3/29/2001	10.2
4/16/2001	9.4
10/9/2001	15.3
4/1/2002	11.2
10/7/2002	9.14
3/31/2003	6.28
9/29/2003	12.1
3/29/2004	7.38
10/11/2004	9.22
3/14/2005	8.32
9/12/2005	7.12
3/27/2006	9.03
9/18/2006	12.8
4/9/2007	11.7
9/18/2007	16.6
3/17/2008	18
9/22/2008	11.2
3/23/2009	17.1
7/15/2009	15.9